What is Claimed is:

1   1. A computer-implemented method of automated software specification,
2   comprising:

3   storing specification modules, with their relations displayed on a
4   computer screen in terms of their specification morphisms, where the specification
5   morphisms translate the specification signatures while preserving the logical structure of
6   the specification;

7   determining and displaying, in response to a user command, multiple
8   specification diagrams, each of which captures the relation between two or more
9   specification modules, along with its specification morphisms;

10   building and displaying, in response to a user command, a diagram of the
11   specification diagrams, the diagram of specification diagrams retaining the diagram
12   morphisms of the specification diagrams; and

13   computing the colimits of the hereditary diagram of diagrams to
14   compose large software modules while preserving the decomposition of the involved
15   components.

16   2. A computer-implemented method for determining a colimit of a hereditary
17   diagram, comprising:
18   extracting the shape colimit of the hereditary diagram stored in a
19   memory, the hereditary diagram including a plurality of diagrams;
20   bringing each of the plurality of diagrams in the hereditary diagram to
21   the shape of the shape colimit to yield a plurality of extended diagrams in the memory;
22   and

23   taking the colimit of the extended diagrams.

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25   3. The method of claim 2, further comprising: receiving from the user an

26 indication to find the colimit of the hereditary diagram.

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28   4. The method of claim 2, wherein extracting the shape colimit of the hereditary

29 diagram includes:

30   determining the shape of each of the plurality of diagrams to yield a

31 shape graph in the memory; and

32   automatically calculating a colimit of the shape diagram.

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34   5. The method of claim 2, further comprising: displaying a representation of the

35 colimit on a display device.

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37   6. The method of claim 5, wherein the representation o the colimit is the name of

38 the colimit.

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40   7. The method of claim 5, wherein the representation of the colimit is a picture

41 of the diagram of the colimit.

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43   8. The method of claim 2, wherein the hereditary diagram includes types of the

44 diagram elements.

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46   9. The method of claim 2, wherein the hereditary diagram includes morphisms

47 between the diagram elements.

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49   10. The method of claim 2, wherein the hereditary diagram is displayed with

50 indicators on its arcs indicating what morphism is associated with the arcs.

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52   11. The method of claim 2, wherein the colimit of the hereditary diagram is

53   displayed with indicators on its arcs indicating that that arcs constitute a cocone colimit.

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55   12. A computer-implemented system of automated software specification,

56   comprising:

57   specification modules stored as separate entities, with their relations

58   displayed on a computer screen in terms of their specification morphisms, where the

59   specification morphisms translate the specification signatures while preserving the

60   logical structure of the specification;

61   a portion that determines and displays, in response to a user command,

62   multiple specification diagrams, each of which captures the relation between two or

63   more specification modules, along with its specification morphisms;

64   a portion that builds and displays, in response to a user command, a

65   diagram of the specification diagrams, the diagram of specification diagrams retaining

66   the diagram morphisms of the specification diagrams; and

67   a portion that computes the colimits of the hereditary diagram of

68   diagrams to compose large software modules while preserving the decomposition of the

69   involved components.